EFFECTS OF PRESCRIBED BURNING ON HERPTILES IN SOUTHEASTERN QUEENSLAND

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Study of herptile faunas within native forests and managed exotic pine plantations, subject to different burning regimes, produced inconsistent results with respect to the effects of fire management on vertebrate diversity and species richness. Abundance varied markedly among burning regimes in native forest areas (SPA1). □ *Herptiles, diversity, burning, species richness.*

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Information on the long term effects of repeated fires on fauna appears to be scant (Christensen & Abbott, 1989). There are few studies on the effects of fire on reptiles (Lunney et al., 1991) and fewer on amphibians (Bamford, 1992). The Beerburrum Plantation Complex (centred on Beerburrum Forestry Office: 26° 57' S, 152° 57' E), some 50 km north of Brisbane, incorporates relatively undisturbed native forest and managed plantations of exotic pine. These have mainly been burnt at 2-3 year intervals. There has been, however, no assessment of the impact of this or any other fire management regime on the fauna of these forests.

This study aimed to provide information on the diversity and density of herptiles in forests subject to different burning regimes. The native vegetation study was located in Scientific Purpose Area 1 (SPA1). Vegetation types in the SPA1 include heath, herblands, shrublands, and Scribbly Gum/Bloodwood associations. Fire treatment plots consisted of a control (unburnt since 1973), plots burnt during autumn-winter on a 3 year cycle (last burned 1991) and during winter-spring on a 5 year cycle (last burned 1993). Each plot was approximately 1.5 ha, with two replicate plots per treatment. Data from these replicates were pooled. The plantation study was located in the Twins Plantation Area (TPA), established in 1947-49 with *Pinus elliotii, P. carribaea var. hondurensis*, hybrids of these species, and remnant riparian and swamp vegetation. Treatments were located in three separate compartments: a control (unburnt since establishment) and two treatments (without fire for 7 years and without fire for 2 years). There was no regular burning, as per the SPA1. Compartments averaged 25ha in area; systematic sampling targeted three 1ha quadrats per compartment/treatment.

Systematic sampling involved pitfall trapping with drift fences and active searching. Five pitfall traps, 400 mm deep by 240mm diameter, placed at five metre intervals, connected by a 300mm high aluminium fly wire drift fence, formed a pitfall line. There were 6 and 3 pitfall lines per treatment in the SPA1 and TPA, respectively. The SPA1 plots were surveyed over 6 consecutive days each (11-28 January 1994) and the TPA over 5 consecutive days each (24 March-20 April 1994). There were 180 and 75 pitfall trapping nights of effort per treatment in the SPA1 and TPA, respectively. A Diversity Index (Shannon & Weaver, 1949) was calculated for each treatment based on pit trapping data. Study areas were also actively and systematically searched. Incidental records were made in and around the study areas.

Systematic pit trapping and active searches recorded 133 individuals of 11 species of reptiles and 263 individuals of 4 species of amphibians in the SPA1, and 54 individuals of 9 species of reptiles and 124 individuals of 9 species of amphibians in the TPA (Table 1). Identifications were made by DH. With the exception of *Rhinoplocephalus boschmai cf.* and *Litoria brevipalmata*, the species recorded were typical for forests of the region. The *Rhinoplocephalus* spp. was uncharacteristic of *R. nigrescens* and was recorded as *R. boschmai*. *L. brevipalmata* was unexpected from the pine plantation; but the specimens caught and released in the TPA, conformed fully with the description by Cogger (1992). Specimens from the same locality have since been identified by G. Ingram (Qld Museum, pers. comm.). *L. brevipalmata* is listed as rare in Queensland (QDEH, 1993) along with *Crinia tinnula*, the most commonly caught species in the

TABLE 1.

Species	Native Vegetation				Pine Plantation			
	Unburnt	3 yr burn	5 yr burn	Incidental	Unburnt	2 yrs no fire	7 yrs no fire	Incidental
REPTILES								
Agamidae								
Amphibolurus nobbi	1	2	1					
Diporiphora australis		2(1)	1(5)					
Pogona barbata					-(1)	-(1)		
Varanus varius			-(1)					
Scincidae								
Calyptotus scutirostrum							1	
Cryptoblepharus virgatus	-(2)	-(2)	-(4)		-(3)			
Ctenotus arcanus	-	1(1)	3(1)					
Eulampris tenuis				Present				
Haemisphaeriodan gerrardii	2	-(1)						
Lampropholis amicula					4		1	
*Lampropholis delicata*1	14(11)	9(19)	7(38)		2(20)	-(3)	5(9)	
Lygisaurus foliorum		1						
Tiliqua scincaides	1							
Colubridae								
Dendrelaphis punctulata						-(1)		
Tropidonophis mairii				Present				Present
Elapidae								
Demansia psammophis		1			-(1)			
Hemiaspis signata	-(1)				-(1)			
Rhinoplocephalus boschmai				Present				
Rhinoplocephalus nigrescens					-(1)			
Pygopodidae								
Lialis burtonis								Present
AMPHIBIANS								
Myobatrachidae								
Adelotus brevis						1	1	
Crinia tinnula	37(4)	38(14)	30(24)		1			
Limnadynastes arnatus					1			
Limnodynastes peronii		2(2)	-(9)		11	21	15	
Limnodynastes terraereginae	2(2)	5	4					
Pseudophryne coriacea					1	1	2	
Hylidae								
Litoria brevipalmata					-(2)	-(3)	8	
Litoria caerulea				Present				
Litorio fallax				Present				Present
Litoria latopalmata						-(1)		
Litoria nasuta							-(2)	
Bufonidae								
Bufa marinus	4(2)	18(6)	47(13)		22(1)	11(10)	9	
TOTAL NUMBERS	61(22)	79 (46)	93 (95)		42 (30)	34 (19)	42 (11)	
NUMBER OF SPECIES	9	12	10	5	13	9	9	3
SHANNON INDEX	1.18	1.56	1.25		1.91	1.26	2.42	

SPA1. The introduced *Bufo marinus* was common in both study areas. It associated significantly with the treatment burned every 5 years (fired 6 months previously) and avoided the control (X^2=41.8, df=2, P<0.05) in the SPA1. In contrast, it associated significantly with the control in the TPA (X^2=7.0, df=2, P<0.05).

The treatment burnt every 3 years (fired two and a half years previously) within the SPA1 and the treatment without fire for 7 years in the TPA yielded the highest Diversity Indices. The 3 year burnt treatment within the SPA1 and the control within the TPA returned the highest species numbers (pit-trapping and searching combined); there were no significant differences among treatments within either the SPA1 or TPA. The study suggests that fire management does not consistently affect diversity and species richness of herptiles. However, abundance did vary markedly among burning regimes in the SPA1 (X^2=42.3, df=2, P<0.05), with more than expected numbers occurring within the treatment burnt every 5 years (fired 6 months previously) and fewer in the unburnt control; differences were partly explained by *B. marinus* captures, but also *Lampropholis delicata* captures.

The numbers of species (exeluding incidental records) were comparable between the SPA1 and TPA (15 and 18 respectively), despite differences in trapping and searching effort. Nevertheless, species composition was different in the pine plantation compared to native vegetation.

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LITERATURE CITED

BAMFORD, M. 1992. The impact of fire and increasing time after fire upon *Helioporus eyrei, Limnodynastes dorsalis and Myobatrachus gouldii* (Anura: Leptodactylidae) in *Banksia* woodland near Perth, Western Australia. *Wildlife Research* **19**: 169-78.

COGGER, H.S. 1992. Reptiles and amphibians of Australia. (Reed Books: Sydney).

LUNNEY, D., EBY, P. & O'CONNELL, M. 1991. Effects of logging and fire on small mammals in Mumbulla State Forest, near Bega, New South Wales. *Australian Wildlife Research* **14**: 163-81.

QUEENSLAND DEPARTMENT OF ENVIRONMENT AND HERITAGE 1993. Preliminary list of rare and threatened vertebrates in Queensland. (Department of Environment and Heritage: Brisbane).

SHANNON, C.E. & WEAVER, W. 1949. The mathematical theory of communication. (University of Illinois: Urbana).

TABLE 1. Numbers of herptiles captured in pitfall traps and by active searching (in parentheses) in control and fire treatments in SPA1 and TPA. Other incidental records are provided for each study area. Shannon index for pit trapping only.